Stock Market performance and modern portfolio theory: Case on Malaysian stock market and Asian Indices

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Abstract: - Stocks market performance measurement has long been regarded as the most interesting part in investment. Many new methods emerge every year but most of these are rooted from Modern Portfolio theory by Harry Markowitz. In this research paper, we have used the efficient frontier from modern portfolio theory to determine the best stocks performance in KLCI index from 2006-2010. The data is compared to Sharpe performance measurement and we've discussed on how the best performers under efficient frontier do not agree with the result of best performers under Sharpe performance measurement. We have extended our study to look into Asian Indices include Japan, India and Hong Kong while setting the US market as our benchmark by using risk and return, together with coefficient of variance to rank the indices. We have also argued on the highest risky index. To complete the study, we've also used Johansen co-integration test to envisage the Asian indices market direction and economy influence. We have also discovered that most of the Asia markets co-integrate and follow Japanese market (N225) rather than the US market (S&P500).

Key-Words: - Stock market, Malaysia, Asia, case study, index, Japanese market, portfolio theory.

1 Introduction

In this era, capital market has become one of the alternative investments. In Malaysia, capital market has increased very significantly, especially after several financial crises. Investors realize that investing in stock market will provide them good returns and provide a major contribution for economic development in Malaysia. Investors used many techniques to optimize their return and reduce the risk of their portfolios. Among the methods they used was the Modern Portfolio Theory (MPT).

In MPT, stock portfolio model is optimized by minimizing the risk of the portfolio as measured by the variance of stock prices; subject to given portfolio return. In short, MPT is a way to determine just how many eggs to put in each of several specified baskets. Markowitz also demonstrated that for a given level of risk, an investor can identify particular combinations of securities that maximize the expected return. Markowitz referred to a continuum of such portfolios in dimensions of expected return and standard deviation as the 'efficient frontier'. According to Markowitz's E-V maxim, investors should restrict their choice of portfolio to those that are located along the efficient frontier. The efficient frontier considers a universe of risky investments and explores what might be an optimal portfolio based upon those possible investments. The notion of 'optimal' portfolio can be defined in one of these two ways: for any level of risk (standard deviation), consider all the portfolios which have that level of risk. From among them all, select the one which has the highest expected return; and for any expected return, consider all the portfolios which have that expected return. The efficient frontier comprises a series of points, each of which represents a particular allocation of assets across the clusters. Each allocation produces a specific return at a specific level of risk.

2 Background Review

In 1956, Harry Markowitz published the 'critical line algorithm' to trace out the efficient frontier, given estimates of expected returns, variances and covariance's, for any number of securities subject to various kinds of constraints.

Portfolio selection issue is continuously gaining interest among scholars. H. Markowitz [1] has initiated significant contribution to the finance body of knowledge when he introduced the mean-variance model which has become a foundation to the modern portfolio theory (MPT). Markowitz's idea on the mean-variance approach was then expended by Sharpe [2], Mossin [3] and Lintner [4].

General objectives of portfolio management are to diversify the investment of diversifiable portfolio risk and to maximize the portfolio return. By having the right combination of assets, these objectives can be achieved. Markowitz's mean-variance model has incorporated the asset return and co-variance factors as main contributors to the portfolio risk. Variance measures the volatility of asset return from the average of rate of return for both negative and positive return. By using H. M. Markowitz [5] model, it revealed that the portfolio variance can be minimized by having weak or negative assets correlation in the portfolio. Since then, the model was well accepted by investors and fund managers who aimed to construct an efficient portfolio with the highest diversification benefit. Portfolio diversification is influenced by many factors that govern the portfolio selection criteria such as the firm sizes, financial ratios, stock markets and investor's judgment.

Reinganum [6] has conducted a study on abnormal return in small firm portfolio in the New York Stock Exchange (NYSE) and American Stock Exchange (AMEX). He had ranked the firm's market value and divided it into 10 equally weighted portfolios. The risk-adjusted returns for extended periods of 10 to 15 years of small firms have indicated they are consistently superior to the larger firms. He has claimed that the firm size is more dominance than PE ratio in influencing the portfolio performance as reported by Basu [7]. Subsequently, Basu [8] re-examined Reinganum's [6] works for different study period and different portfolio construction methods and found that the small and low PE ratio portfolios have highest risk-adjusted returns. In Malaysian case, Sazali et.al [9] have evidenced that for long term, the Malaysian domestic small firm's portfolio provide the highest diversification benefit compared to other portfolio classification such as domestic-large firms, international-developed and developing countries portfolio. The results suggested that in the long term, there are smaller stocks on the Bursa Malaysia which are correlated at the low values with each other as compared to assets of international portfolios or a portfolio of larger stocks on the exchange. Besides the assessment of portfolio's efficiency, diversification also can be achieved by having appropriate number of asset. According to Tang, [10] portfolio diversification also can be achieved by having sufficient number of assets in the portfolio. Previous studies show that the numbers of required asset are varied. It ranged from 10 to 40 assets. Statman [11] and Evans and Archer [12] have proposed that the appropriate numbers of assets in a portfolio are between 10 to 15 or less than 40 respectively. Additionally, finding by Solnik [13] showed that the asset number is around 20 for the US stocks and international portfolios. In Malaysian stock market, Zulkifli, Basarudin, Norzaidi and Siong [14] revealed that 15 stocks are sufficient to diversify away the diversifiable risk in the Malaysian stock market.

At international level, a study by Solnik [13] noted that international diversification is more dominant than inter-industry diversification. To encounter this view, Cavaglia, Brightman and Aked [15] had investigated the importance of industry diversification besides inter country diversification. Within the period from December 1985 to November 1999, 21 equity markets were developed and it covered various industries. They presented evidence that industry factors have been growing relatively important and may now dominate country factors. Furthermore, their evidence suggests that, diversification across global industries provides greater risk reduction than diversification by countries. They concluded that industry allocation is an increasingly important consideration for active managers of global equity portfolios and investors may wish to reconsider home-biased equity allocation policies.

In the context of globalization, international markets have turned out to be more open, leading to a common perception that global capital markets have grown to be more integrated. This integration resulting in higher correlation would imply about the diversification potential across countries. Therefore, international diversification becomes more common to investors. Previous studies show that there are diversification benefits in international markets as well as Asia domestic market. Solnik [13], Santis and Gerard [16], Lewis [17], Driessen and Laeven [18] have confirmed this matter.

In this study, the issue that the researcher wants to discuss is the risk and return of investing in assets and hence on how to select the right stocks which offer good return with acceptable range of risk. The case data consists of active traded stocks in Malaysia. We have observed through the stock's price. The data retrieved is daily data gathered from year 2006 to 2010. The selection of data samples are done via purposive sampling criteria namely random sampling in which data is taken from the pool of stocks that are active based on the frequency of transactions and the companies during the period 2006-2010. The data to be used to calculate the stocks risk and return will be by using the daily stock adjusted close price. The tool employed to determine the optimal portfolio is the Markowitz

Efficient Frontier and the conclusion for this research summarizes two objectives, how to create an attractive portfolio from stocks in Malaysia and selected Asian Index.

3 Case Data Analysis

3.1 Risk and return of Single Asset

Mapping from risk and return of single asset

This section will explain how we do mapping and graph each single asset in which each single asset is divided into levels that have been determined on the basis of the existing range. The mapping output will then decide on disaggregation of assets into classifications which are risk adverse investors, moderate investors, and also aggressive investors with return requirements like low return requirements, medium return requirements, and high return requirements seen from its risk to return

The single asset with return of 0.01% -0.10% will be considered as low-return single asset while single asset with 0.11% - 0.20% will be considered as medium-return single asset. The single asset which has return higher than 0.20% will be considered as high-return single asset. Apart from that, to decide on the risk, the single asset with standard deviation less than 2.5% will be considered as low-risk single asset while the stocks with standard deviation around the range of 2.6% - 3.5% is considered as medium-risk single asset. Finally, the single asset which has the standard deviation more than 3.5% will be considered as high-risk single asset. Below is the risk and return table of each single asset.

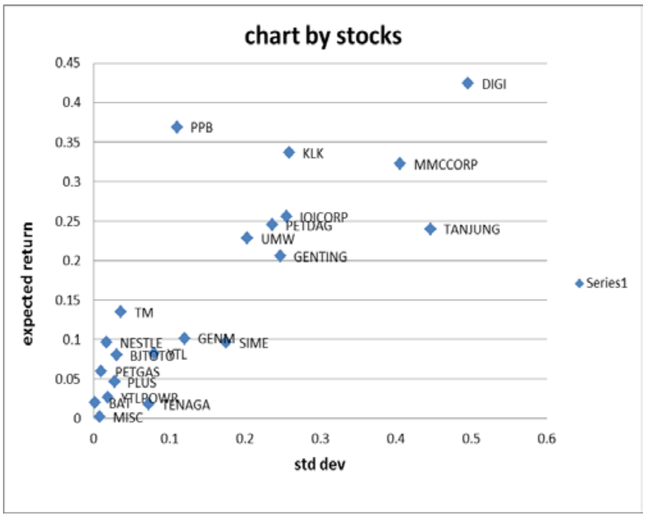
As displayed in Table 1, we could justify that investors can choose the stocks based on their risk preference and we can group the investors and the stocks in their own category.

Figure 1 shows that based on Table 1, we can group stocks of these companies such as IOI Corp, PETRONAS Dagang, UMW Toyota and Genting as high level of investment rank and they lie on the efficient frontier.

Table 1: Level Of Single Asset

STOCKS	STDEV	EXP RTN	Investment rank	Investor type
BAT	0.01984	0.019905	low	risk adverse
NESTLE	0.01733	0.096271	low	risk adverse
UMW	0.203422	0.228009	high	risk taker
GENTING	0.247057	0.205468	high	Risk taker
GENM	0.120662	0.101486	medium	neutral
BJTOTO	0.030113	0.080134	low	risk adverse
IOICORP	0.255199	0.255452	high	risk taker
KLK	0.259192	0.336245	high	risk taker
PPB	0.110604	0.369031	medium	neutral
SIME	0.175822	0.095942	medium	neutral
DIGI	0.49603	0.424429	high	Risk taker
TM	0.036071	0.134975	medium	neutral
MISC	0.007911	0.002296	low	risk averse
PLUS	0.027404	0.046212	low	risk averse
PETDAG	0.236529	0.245263	high	Risk taker
PETGAS	0.010011	0.059649	low	Risk averse
MMCCORP	0.405886	0.322686	high	risk taker
TENAGA	0.072779	0.017684	low	risk averse
YTLPOWR	0.018366	0.0264	low	risk averse
TANJUNG	0.446547	0.239901	high	risk taker
YTL	0.07985	0.082058	low	risk averse

Figure1: Risk and Return of Efficient Stock Portfolio



3.2 Sharpe Performance Index

Referring to the Table 2, we can make conclusion that efficient portfolio as portrayed in Figure 1 does not match with the rank portrayed by Sharpe's performance ratio. All stocks of the companies that we can categorize as efficient stock such as IOI, PETRONAS Dagang, UMW and Genting are not enlisted as best performers after we deduct the risk free asset using the Sharp ratio formula as displayed:

$$S = \frac{E(R) - R_f}{\sigma} \quad (1)$$

Where E(R)= expected return of a stock
R_f = Risk free rate
σ = standard deviation of a stock

It is shown that according to Sharpe ratio, the best performers are Nestle, Public Bank Berhad (PBB), Telekom Malaysia (TM) and PETRONAS Gas (PETGAS). The conclusion that we can make is that the normal efficient portfolio which only base on expected return and standard deviation are no longer the best performers after we deduct the risk free asset from its expected return.

This study proves that efficient portfolio must be combined with sharpe's ratio to find the best performance of any selected portfolio.

Table 2: Risk, return and Sharpe ratio

STOCKS	STDEV	EXP RTN	Sharpe Ratio
BAT	0.01984	0.019905	-1.01277
NESTLE	0.01733	0.096271	3.34698
UMW	0.203422	0.228009	0.924233
GENTING	0.247057	0.205468	0.669758
GENM	0.120662	0.101486	0.509577
BJTOTO	0.030113	0.080134	1.332768
IOICORP	0.255199	0.255452	0.844252
KLK	0.259192	0.336245	1.142954
PPB	0.110604	0.369031	2.97486
SIME	0.175822	0.095942	0.318174
DIGI	0.49603	0.424429	0.775011
TM	0.036071	0.134975	2.632976
MISC	0.007911	0.002296	-4.76578
PLUS	0.027404	0.046212	0.226696
PETDAG	0.236529	0.245263	0.867816
PETGAS	0.010011	0.059649	1.962707
MMCCORP	0.405886	0.322686	0.696467
TENAGA	0.072779	0.017684	-0.30663
YTLPOWR	0.018366	0.0264	-0.7405
TANJUNG	0.446547	0.239901	0.447658
YTL	0.07985	0.082058	0.526709

3.3 Asian Stock Index efficiency

In this section, we have calculated the standard deviation and total return of major Asian index such as Kuala Lumpur (KLCI), Japan (N225), India and Hong Kong (HK) and used S&P500 as our benchmark. Table 3 and Table 4 display all the results and in addition, we have included the coefficient of variations (CV) to determine the rank of every index. According to CV rule, the smaller the CV is, the better is the index or stock or portfolio. We have found out that the highest risk index is recorded by the KLCI which had appeared 2 times as the highest CV; in the year 2006 and year 2008. This can be the result of the pre and post 2007 crisis. The lowest CV is S&P500 which appears to be the lowest CV in 2007 and 2008. This result shows that small markets like Malaysia is volatile and sensitive to economic conditions since the CV of Malaysia seems to be back to normal in 2010 as the lowest CV for that particular time. The most stable market among the entire index is the Japanese market. This is said so because their CV seems to be stable all the time compared to S&P500.

Table 3: Asian Indices risk and return

YEAR		KLCI	N225	S&P500	INDIA	HK
2006	standard deviation	0.00351	0.008420836	0.002025208	0.015942853	0.004650644
	Expected return	0.00351	0.008420836	0.002025208	0.015942853	0.004650644
2007	standard deviation	0.00501361	0.004373855	0.001030541	0.005481384	0.006379432
	Expected return	0.000620372	0.000238714	0.005190337	0.000160253	0.000722974
2008	standard deviation	0.020767205	0.006948804	0.003801592	0.010197167	0.015566173
	Expected return	0.000133978	-5.09762E-05	0.000964586	0.000200565	0.000694381
2009	standard deviation	0.003427232	0.007465456	0.006188316	0.005075701	0.006929201
	Expected return	-0.000258382	-0.000821281	-0.000421379	0.00038774	-0.000534374
2010	standard deviation	0.001064438	0.004135121	0.001504369	0.006423016	0.002447816
	Expected return	0.000504692	0.00088952	0.00044102	0.001295284	0.000787586

Table 4: Coefficient of variation Of Asian indices from 2006-2010

indexes	CV 2006	CV 2007	CV 2008	CV 2009	CV 2010
KLCI	9.724899 **	8.081616	155.0044 **	-13.2642	2.109084 *
N225	-11.0105	18.32258	-136.315	-9.09002*	4.648711
S&P500	7.753449	0.19855*	3.941164 *	-14.6859**	3.411114
INDIA	7.455145	34.20451 **	50.84211	13.09049	4.958772 **
Hk	4.006165 *	8.823874	22.41732	-12.9669	3.108

NOTE: ** The highest CV for the year
*The lowest CV for the year

3.4 Sharpe Performance measurement

In the context of Sharpe Performance measurement we can form the following table; Table 5 that displays data from the year 2006-2010 and how S&P500 dominates as the best performance but in 2009 and 2010 is dominated by KLCI. This phenomenon arises because of the instability of Europe market that influences the US economy which contribute to global financial crisis that attacks the most of Europe and the US economy. KLCI appears to be a good investment in 2009 and 2010 as we go for high income economy transformation although our foreign domestic income shrinks in 2009 as the consequence of the collapse of technology bubble and global financial crisis. In 2010, Malaysian market appears as a good investment as its external debt decreased to 226.5B (BNM report). This contributes to the better performance of KLCI Sharpe index performance measurement.

Table 5: Sharpe ratio performance Asian indices from 2006-2010

YEAR	KLCI	N225	S&P500	INDIA	HK
2006	11.29318257	4.84094469	19.62207989*	2.374825697	8.351344198
2007	7.854544843	9.090672329	33.77805993*	7.268191628	6.156821835
2008	1.919662363	5.763721862	10.26817574*	3.902989299	2.525066349
2009	11.74661859*	5.468022113	6.531886621	7.804294261	5.849790141
2010	37.10437275*	9.458121974	26.29605404	6.025940716	16.01934417

*Best index performer of the year

3.5 Co-integration

If two or more series are individually integrated (in the time series sense) but some linear combination of them has a lower order of integration, then the series are said to be co-integrated. A common example is where the individual series are first-order integrated (**I (1)**) but some (**co integrating**) vector of coefficients exists to form a stationary linear combination of them. When you are estimating a model that includes time series variables, the first thing you need to make sure is that either all time series variables in the model are stationary or if they are co-integrated, which means that they are integrated of the same order and errors are stationary, in which case the model defines a long run equilibrium relationship among the co-integrated variables. Therefore, a co-integration test generally takes two steps and these are summarised in Table 6. The first step is to conduct a unit root test on each variable to find the order of integration. If all variables are integrated of the same order, the second step is to estimate the model, also called a "co-integrating equation," and test whether the residual of the model is stationary.

Table 6: Asian indices Johansen co-integration results

HK and IND

Unrestricted Co-integration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None	0.002304	10.47576	15.49471	0.2459
At most 1	0.000373	1.459715	3.841466	0.2270

Trace test indicates no Co-integration at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Co-integration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**

None	0.002304	9.016049	14.26460	0.2848
At most 1	0.000373	1.459715	3.841466	0.2270

Max-eigenvalue test indicates no Co-integration at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

HK and KLCI

Unrestricted Co-integration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None	0.001305	7.522775	15.49471	0.5177
At most 1	0.000491	2.055224	3.841466	0.1517

Trace test indicates no Co-integration at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Co-integration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None	0.001305	5.467551	14.26460	0.6820
At most 1	0.000491	2.055224	3.841466	0.1517

Max-eigenvalue test indicates no Co-integration at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

HK and NK225

Unrestricted Co-integration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.004101	19.78785	15.49471	0.0106
At most 1	0.000615	2.577534	3.841466	0.1084

Trace test indicates 1 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Co-integration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.004101	17.21032	14.26460	0.0166
At most 1	0.000615	2.577534	3.841466	0.1084

Max-eigenvalue test indicates 1 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

HK and S&P500

Unrestricted Co-integration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None	0.002412	10.88520	15.49471	0.2186
At most 1	0.000184	0.771155	3.841466	0.3799

Trace test indicates no Co-integration at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Co-integration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None	0.002412	10.11405	14.26460	0.2045
At most 1	0.000184	0.771155	3.841466	0.3799

Max-eigenvalue test indicates no Co-integration at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level

**MacKinnon-Haug-Michelis (1999) p-values

India and KLCI

Unrestricted Co-integration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None	0.001919	8.445362	15.49471	0.4191
At most 1	0.000240	0.937160	3.841466	0.3330

Trace test indicates no Co-integration at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Co-integration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None	0.001919	7.508202	14.26460	0.4309
At most 1	0.000240	0.937160	3.841466	0.3330

Max-eigenvalue test indicates no Co-integration at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

India and N225

Unrestricted Co-integration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.004435	18.35523	15.49471	0.0180
At most 1	0.000252	0.984869	3.841466	0.3210

Trace test indicates 1 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Co-integration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.004435	17.37036	14.26460	0.0156
At most 1	0.000252	0.984869	3.841466	0.3210

Max-eigenvalue test indicates 1 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

India and S&P500

Unrestricted Co-integration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None	0.000902	4.954648	15.49471	0.8136
At most 1	0.000365	1.428045	3.841466	0.2321

Trace test indicates no Co-integration at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Co-integration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None	0.000902	3.526603	14.26460	0.9056
At most 1	0.000365	1.428045	3.841466	0.2321

Max-eigenvalue test indicates no Co-integration at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

KLCI and NK225

Unrestricted Co-integration Rank Test (Trace)

Hypothesized		Trace	0.05

No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None *	0.005029	25.06735	15.49471	0.0014
At most 1 *	0.000937	3.930890	3.841466	0.0474

Trace test indicates 2 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Co-integration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.005029	21.13646	14.26460	0.0035
At most 1 *	0.000937	3.930890	3.841466	0.0474

Max-eigenvalue test indicates 2 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

KLCI and S&P500

Unrestricted Co-integration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None	0.001352	6.900254	15.49471	0.5893
At most 1	0.000294	1.231746	3.841466	0.2671

Trace test indicates no Co-integration at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Co-integration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None	0.001352	5.668508	14.26460	0.6560
At most 1	0.000294	1.231746	3.841466	0.2671

Max-eigenvalue test indicates no Co-integration at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

S&P500 and n225

Unrestricted Co-integration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.004458	19.92023	15.49471	0.0101
At most 1	0.000286	1.198518	3.841466	0.2736

Trace test indicates 1 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Co-integration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.004458	18.72172	14.26460	0.0092
At most 1	0.000286	1.198518	3.841466	0.2736

Max-eigenvalue test indicates 1 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

From the table 7, we can conclude that most of the Asian markets co-integrate and follow Japanese market (N225) rather than the US market (S&P500). This phenomenon is influence by the economic factors of the Asia regime and most of our firms collaborate with Japanese firm because of their advancement in technology. However, the Japanese market is following the US market, so in a way or another, although most of the Asia market does not co-integrate with the US market but they are indirectly influenced by the US Market through Japanese market. This integration results in higher correlation would imply about the diversification potential across countries. Therefore, international diversification becomes more common among investors.

Table 7: Summarization of Co-integration results for all indices

	KLCI	India	N225	S&P500	HK
KLCI	0	Co(0)	Co(2)	Co(0)	Co(0)
India	Co(0)	0	Co(1)	Co(0)	Co(0)
N225	C0(2)	Co(1)	0	Co(1)	Co(1)
S&P500	Co(0)	Co(0)	Co(1)	0	Co(0)
HK	Co(0)	Co(0)	Co(1)	Co(0)	0

4 Conclusion

Capital market in Malaysia has increased very significantly, especially after several financial crises and the collapse of technology bubble in year 2009. Although investors have many choices in investing their money, they still prefer the stock markets because they realize that investing in stock market will provide them good returns and provide a major contribution for economic development in Malaysia. However, when dealing with stocks investment, investors must have strategy and adequate knowledge to enhance their investment to a very maximum level. One of the ways is to use portfolio optimization. In Modern Portfolio Theory, stock portfolio model is optimised by minimising the risk of the portfolio as measured by the variance of stock prices; subject to a given portfolio return. In this paper we applied these methods to KLCI stocks and found out the stocks of the companies such as IOI Corp, PETRONAS Dagang, UMW Toyota and Genting has a high level of investment rank and lie on the efficient frontier. This study also mapped the risk and returns of every stock and categorise each stock into investor's preference such as risk adverse, moderate or aggressive investors.

The case study challenged the modern portfolio theory by employing the Sharpe measurement into the stocks and found out the best stocks picked by the efficient frontier do not appear to be the top performers under Sharpe performance measurement. It is shown that according to Sharpe ratio the best performer is Nestle, Public Bank Berhad (PBB), Telekom Malaysia (TM) and PETRONAS Gas (PETGAS). We can thus conclude that the normal efficient portfolio which is only based on expected return and standard deviation are no longer the best performers after we deduct the risk free asset to its expected return. We have also expanded our study into Index performance in the Asian markets which includes Indian, Japan, Hong Kong and Malaysia markets index with S&P 500 from US market as our benchmark. We have used expected return and standard deviation together with their coefficient of variants to rank the index. It is then discovered that the highest risky index is recorded by the KLCI which had appeared two times as the highest CV is the year 2006 and 2008. The lowest CV is recorded by S&P500 which appears to be the lowest CV in 2007 and 2008. This result shows that small markets like Malaysia is volatile and sensitive to economic conditions since the CV of Malaysia seems to set back to normal in 2010 as the lowest CV for that particular time. The most stable market among the entire index is Japanese market. Their CV seems to be stable all the time in relative to S&P500.

To measure the performance of every index, we again use the Sharpe ratio performance measurement. It appeared that from 2006 to 2009 S&P500 dominates all markets and in 2009 and 2010 Malaysian KLCI dominates the market. This is the impact of high income economy transformation that strengthens our economy and stimulates the stocks market performance. To complete this research we have also analysed the market direction and influence power by using Johansen Co-integration test as you could see in Table 6. The results from this co-integration test revealed that most of the Asia markets co-integrate and follow Japanese market (N225) rather than the US market (S&P500). This may be influenced by our geographical location and economics inter-dependency among Asian markets. Researchers may look into the risk level of these indices and also stocks in Malaysia by using method such as Monte Carlo and Var analysis.

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